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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,099	09/28/2006	Klaus Endres	P30123	6063

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EXAMINER	
EMPIE, NATHAN H	

ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/585,099	ENDRES ET AL.	
	Examiner	Art Unit	
	NATHAN H. EMPIE	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 January 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *44-76* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *44-76* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Examiner acknowledges receipt of 1/7/10 amendment to the claims which was entered into the file. Claims 1-43 are cancelled, and claims 44-76 are currently pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 44-46, 49-51, and 53-60, 63-66, 68-73, and 75-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig et al (US patent 6,162,498 as supplied in applicant's IDS dated 2/5/07; hereafter Mennig) in view of Hench et al. (US patent 4,851,150; hereafter Hench).

Claim 44: Mennig teaches a process for making a metallic substrate having a vitreous coating (see, for example, abstract), wherein the process comprises;

(a) applying an alkali metal silicate-containing coating sol to the substrate to provide a coating layer on the substrate (see for example, abstract, and col 6 lines 14-56);

and (b) thermally densifying the coating layer of (a) by a two-stage heat treatment comprising, in a first stage, a heat treatment (see, for example, drying at a temperature up to 100^{o}C, col 4 lines 13-20) and, in a second stage, a heat treatment in a low-oxygen atmosphere up to full densification with formation of a vitreous layer (see, for example, col 4 lines 20-27, and abstract).

Mennig teaches wherein a first heat stage (drying) can be conducted by a conventional drying operation at temperatures of about 100°C (See, for example, col 4 lines 13-20). But Mennig is silent as to specific conventional drying conditions, so Mennig does not explicitly teach wherein the drying process is conducted in an oxygen-containing environment. Hench teaches a method of forming sol-gel derived silicon containing articles (See, for example, abstract). Furthermore Hench explicitly teaches that it is well known in the art to predictably dry such sol-gel derived silicon containing articles in oxygen-containing atmosphere (air) (see, for example, col 9 lines 21-24). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated drying in air into the method of Mennig since Mennig is silent as to the specifics of conventional drying and when a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference, and such secondary reference, Hench, has taught the specific conditions of just such a conventional drying process to predictably dry a sol-gel derived silicon containing article.

With regards to the limitation directed to the vitreous coating's ability to be altered by stress or pressure, the examiner asserts that inherently at sufficient pressures and / or stresses any material's shape can be altered. Further, where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of obviousness has been established, In re Best, 195 USPQ 430, 433 (CCPA 1977).

Claim 45: Mennig further teaches wherein the heat treatment of the first stage is carried out according to alternative (A) at an end temperature of up to about 100°C (see for example, col 4 lines 1-20).

Claim 46: Hench further teaches wherein the oxygen-containing atmosphere comprises about 20% by volume of oxygen (air) (see, for example col 9 lines 21-24).

Claim 49: Mennig further teaches wherein the heat treatment of the second stage is carried out at an end temperature of 500°C (see, for example, col 6 lines 42-45).

Claim 50: Mennig in view of Hench teaches the method of claim 35 (described above), and Mennig further teaches wherein the second stage of heat treatment is carried out at an end temperature based on the heat resistance of the underlying metallic surface, and preferably at a temperature of least 500°C in an oxygen-free atmosphere (see, for example, col 4 lines 20 - 27). Although Mennig in view of Hench does not explicitly teach wherein the end temperature of the second stage is in the range from 540°C to 560°C it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated such an end temperature range since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 51: Mennig further teaches wherein the heat treatment of the second stage is carried out in an inert gas atmosphere (see, for example, nitrogen or argon, col 4 lines 25-27).

Claim 53: Mennig further teaches wherein the thermally treating steps ((b)) are preceded by a drying of the applied coating layer (see, for example, col 6, lines 35 – 45; wherein prior to experiencing the first heat treatment (drying exposure), the coated layer is pre-dried for a short period of time at room temperature).

Claim 54: Mennig further teaches wherein the alkali metal silicate-containing coating sol is obtainable by a process comprising a hydrolysis and polycondensation of one or more silanes of formula R_nSiX_{4-n} wherein the radicals X independently represent hydrolyzable groups or hydroxyl groups, the radicals R independently represent hydrogen, alkyl, alkenyl and alkynyl groups having up to 4 carbon atoms and aryl, aralkyl and alkaryl groups having from 6 to 10 carbon atoms, and n is 0, 1 or 2, with the proviso that at least one silane where n=1 or 2 is used, or oligomers derived therefrom, in the presence of(a) at least one compound selected from oxides and hydroxides of alkali metals and alkaline earth metals, and(b) optionally, nonsocial SiO.sub.2 particles (see, for example, abstract, and col 2 lines 58 – 66 wherein preferably up to 4 carbon atoms is taught).

Claim 55: Mennig further teaches wherein the at least one compound is used in such an amount that an atomic ratio Si :(alkali metal and/or alkaline earth metal) is in a range of from 15:1 to 10:1 (see, for example, col 3 lines 39-45).

Claim 56: refer to rejections of claim 44 and 53 (described above) wherein step (b) is satisfied by a teaching of getting a predried coating at room temperature prior to the start of the two part thermal treatment.

Claims 57-58: Mennig further teaches wherein step (b) (the step of achieving a predried coated article) is conducted at room temperature (see, for example, col 3 lines 35-40)

Claim 59: see rejection of claims 45 and 56 (described above).

Claim 60: see rejection of claims 46 and 59 (described above).

Claim 63: see rejection of claims 49 and 56 (described above).

Claim 64: see rejection of claims 50 and 63 (described above).

Claim 65: see rejection of claims 51 and 63 (described above).

Claim 66: Mennig further teaches wherein the second stage is performed at a residence time at maximum temperature of 60 minutes (1 hour) (see, for example, col 6 lines 44-45).

Claim 68: see rejections of claims 54 and 56 (described above).

Claim 69: see rejections of claims 40 and 68 (described above).

Claim 70: Mennig further teaches wherein the at least one compound is used in such an amount that an atomic ratio Si :(alkali metal and/or alkaline earth metal) is in a range of from 15:1 to 10:1 (see, for example, col 3 lines 39-45).

Claims 71 and 72: Mennig further teaches wherein an average value of n in the silanes of formula (I) is from 0.5 to 1.0 (see, for example, col 2 lines 41-48).

Claim 73: Mennig further teaches wherein the thickness of the vitreous layer is 2 to 4 micron (See, for example, col 6 liens 46-47).

Claim 75: Mennig further teaches wherein the substrate has a structured surface (see, for example, col 5 lines 19 – 22; wherein the substrate surface is taught to possess a roughened surface structure achieved by roughening it).

Claim 76: Mennig further teaches the substrate as stainless steel, and steel (see, for example, col 5 liens 7 - 16).

Claims 47- 48, and 61-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig in view of Hench as applied to claim 44/56 above, and further in view of the content from http://web.archive.org/web/20020427181641/http://www.Mc gillairpressure .com/vac/textdocs/aboutus.html (dated by the Internet Archive Wayback Machine as available on 4/27/02; hereafter McGill).

Claim 47-48: Mennig in view of Hench teach the method of claim 44 (described above), wherein Mennig further teaches a first heat stage (drying) can be conducted by a conventional drying operation at temperatures of about 100°C (See, for example, col 4 lines 13-20). But Mennig is silent as to specific conventional drying conditions, so Mennig does not explicitly teach wherein the drying process is conducted in vacuum at a residual pressure of </ 15 mbar, and further </ 5 mbar. McGill teaches that vacuum drying is conventional in the art and further provides benefits over atmospheric drying resulting in faster drying, more efficient heat recovery, drying at lower temperatures, reducing energy costs and contaminants, etc. (see whole article). Hench teaches a method of forming sol-gel derived silicon containing articles (See, for example, abstract). Furthermore Hench explicitly teaches that it is well known in the art and

preferable to predictably dry such sol-gel derived silicon containing articles under a reduced atmosphere of approximately 1 Torr vacuum (~1.33mbar) (see, for example, col 9 lines 21-24). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated vacuum drying at 1 Torr (~1.33 mbar) into the method of Mennig since Mennig is silent as to the specifics of conventional drying and when a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference, and such secondary references of McGill and Hench have taught that vacuum drying provides benefits over atmospheric drying, and has taught the specific conditions of just such a conventional drying process to predictably dry a sol-gel derived silicon containing article.

Claim 61: see rejection of claims 47 and 56 (described above).

Claim 62: see rejection of claims 48 and 61 (described above).

Claims 52 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig and Hench as applied to claim 44/56 above, and further in view of Chou et al ("Sol-Gel-Derived Hybrid Coatings for Corrosion Protection" in J. Sol-Gel Sci. and Tech. 26, pg 321-327, 2003).

Claim 52: Mennig in view of Hench teaches the method of claim 44 (described above); wherein Mennig further teaches sol-gel derived silicon based coatings are used to protect steel surfaces (see, for example, col 1 lines 1 - 58, and col 6 lines 35-57). Mennig further has taught a method of preparing such coatings wherein the

densification of such coatings is important (see, for example, col 6 lines 35-57), but is silent as to the specific cooling conditions for the coating process, so Mennig and Hench does not explicitly teach the process further comprises cooling the heat-treated substrate at a cooling rate of from 1 to 10 K/min. Chou teaches a method of forming sol-gel derived silicon based coatings intended to protect steel surfaces (see, for example, abstract). Chou has further taught wherein the cooling rate will influence densification, and wherein a suitable cooling rate to predictably densify a sol-gel derived silicon based coatings on a steel surface is a rate of $5^{o}C$ / min (5 K/min) (see, for example, pg 323). When a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference; both Mennig in view of Hench and Chou teach method of forming sol gel derived silicon based coatings intended to protect steel surfaces, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a cooling rate of 5K/min in order to achieve the predictable result of forming a dense sol-gel derived protective silica coating on a steel surface.

Claim 67: see rejections of claims 52 and 56 (described above).

Claim 74 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig and Hench as applied to claim 44 above, and further in view of Callister, Materials Science and Engineering: An Introduction, 5th ed. (c) 2000, John Wiley & Sons, Inc. pg 169-171; hereafter Callister).

Claim 74: Mennig in view of Hench teaches the method of claim 44, wherein a protective coating is taught to be formed on a metallic substrate such as steel (see, rejection above), but Mennig in view of Hench are silent as to how the metallic substrate is formed so neither explicitly teach wherein the substrate has been subjected to a cold forming. Callister teaches that cold forming (strain hardening / cold working) is a well known metallurgical process, which predictably improves a metal articles (such as steel) strength and hardness properties when conducted (see, for example, pg 169-171). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a substrate that has been subjected to a cold forming since such an incorporation would improve the metals strength and hardness, increasing the articles possible uses to situations requiring such properties.

Response to Arguments

Applicant's cancellation of claims 30-43, and exclusion of the term "deformable" from newly presented claims 44-76, filed 1/7/10, have been fully considered and are persuasive with regard to the previous 35 USC 112 2nd paragraph rejections of claims 30-43. The 35 USC 112 2nd paragraph rejections of claims 30-43 has been withdrawn.

Applicant's arguments filed 1/7/10 have been fully considered but they are not persuasive.

In response to applicant's argument that against the combination of Mennig in view of Hench failing to teach a two-stage thermal densification (pg 12 - 15); the examiner asserts that the claim limitation to which the applicants remarks are directed

to are, as claimed, step (b): "Thermally densifying the coating layer of (a) by a two-stage heat treatment comprising, (i) in a first stage, a heat treatment carried out either (A) in an oxygen-containing atmosphere or (B) in a vacuum at a residual pressure of </ 15 mbar, and (ii) in a second stage, a heat treatment in a low-oxygen atmosphere up to full densification with formation of a vitreous layer". The examiner asserts that what is required of the claim is a two stage heat treatment resulting in densification. As described in the previous rejection and the rejection above, Mennig in view of Hench have taught just such as two stage heat treatment meeting the claimed limitations of each stage, and resulting in full densification. Although the heat treatment for the first stage has described as a drying step by the prior art, the functional process occurring during that heat treatment has been taught to satisfy the functionally claimed limitations occurring as this first stage. Therefore whatever the name to the step, as currently claimed, the process taught by the prior art meets the functional claim limitations, so the examiner maintains the rejection over Mennig in view of Hench is appropriate. Further, although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

With regard to the newly added limitations, they have been addressed as discussed in the rejections described above.

As to the dependent claims, they remain rejected as no separate arguments are provided.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHAN H. EMPIE whose telephone number is (571)270-1886. The examiner can normally be reached on M-F, 7:00- 4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. H. E./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792